

Listing of the Claims:

1. (currently amended) A method for making a ferritic stainless steel article having an oxidation resistant surface, the method comprising:

providing a ferritic stainless steel comprising at least 0.2 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is greater than 0.02 weight percent; and

modifying at least one surface of the ferritic stainless steel to remove material from the at least one surface so that, when subjected to an oxidizing atmosphere at high temperature, the modified surface develops an electrically conductive, aluminum-rich, oxidation resistant oxide scale comprising chromium and iron and a having a hematite structure differing from Fe_2O_3 , alpha Cr_2O_3 and alpha Al_2O_3 .

2. (original) The method of claim 1, wherein lattice parameters a_o and c_o of the oxide scale differ from a_o and c_o of Fe_2O_3 , alpha Cr_2O_3 and alpha Al_2O_3 .

3. (original) The method of claim 1, wherein the at least one modified surface develops the oxide scale when heated in an oxidizing atmosphere at a temperature in the range of 750°C to 850°C.

4. (original) The method of claim 1, wherein the at least one modified surface develops the oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C.

5. (original) The method of claim 1, wherein the oxide scale is characterized by lattice parameters a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å.

6. (original) The method of claim 1, wherein the oxide scale is characterized by nominal lattice parameters $a_o = 4.98 \text{ \AA}$ and $c_o = 13.57 \text{ \AA}$.
7. (original) The method of claim 1, wherein modifying the at least one surface comprises electrochemically modifying the at least one surface.
8. (original) The method of claim 6, wherein electrochemically modifying the at least one surface comprises electropolishing the at least one surface.
9. (original) The method of claim 1, wherein the modified surface develops the oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C, and wherein the oxide scale is characterized by a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å.
10. (currently amended) A method for making a ferritic stainless steel article having at least one oxidation resistant surface, the method comprising:
providing a ferritic stainless steel comprising at least 0.2 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is greater than 0.02 weight percent; and
modifying at least one surface of the ferritic stainless steel to remove material from the at least one surface so that the modified surface develops an aluminum-rich oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C, the oxide scale comprising iron and chromium and having a hematite structure, a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å.

11. (currently amended) A method for making a ferritic stainless steel article having an uncoated electrochemically modified oxidation resistant surface, the method comprising:

providing a ferritic stainless steel comprising at least 0.2 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is greater than 0.02 weight percent; and

electrochemically modifying at least one surface of the ferritic stainless steel to remove material from the at least one surface.

12. (original) The method of claim 11, wherein electrochemically modifying the at least one surface comprises electropolishing the at least one surface.

13. (original) The method of claim 12, wherein the at least one electropolished surface develops an aluminum-rich oxide scale comprising iron and chromium and having a hematite structure, a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å, when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C.

14. (original) The method of claim 12, wherein the ferritic stainless steel comprises 16 up to 19 weight percent chromium.

15. (cancelled)

16. (original) The method of claim 12, wherein the ferritic stainless steel comprises 0.2 up to 1.0 weight percent aluminum.

17. (original) The method of claim 12, wherein the total weight of rare earth metals in the ferritic stainless steel is greater than 0.02 up to 1.0 weight percent.
18. (original) The method of claim 12, wherein the ferritic stainless steel comprises at least one rare earth metal selected from cerium, lanthanum, yttrium and hafnium.
19. (original) The method of claim 18, wherein the total weight of rare earth metals in the ferritic stainless steel is greater than 0.02 up to 1.0 weight percent.
20. (original) The method of claim 12, wherein the ferritic stainless steel comprises, in weight percent, 18 up to 22 chromium, 0.4 to 0.8 aluminum and 0.02 to 0.2 REM.
21. (original) The method of claim 12, wherein the ferritic stainless steel further comprises, in weight percent, up to 3 nickel, up to 3 manganese, up to 0.7 silicon, up to 0.07 nitrogen, up to 0.07 carbon and up to 0.5 titanium.
22. (original) The method of claim 12, wherein the ferritic stainless steel comprises, in weight percent, about 22 chromium, about 0.6 aluminum, cerium and lanthanum, wherein the sum of the weights of cerium and lanthanum is up to about 0.10.
23. (original) The method of claim 12, wherein the article is selected from the group consisting of a plate, a sheet, a strip, a foil, a bar, a fuel cell interconnect, high-temperature manufacturing equipment, high-temperature handling equipment, calcining equipment, glass making equipment, glass handling equipment, heat exchanger components.

24. (original) The method of claim 12, wherein the article is a fuel cell interconnect and the ferritic stainless steel comprises 16 to less than 30 weight percent chromium, at least 0.2 weight percent aluminum, and at least one rare earth metal, wherein the total weight of rare earth metals is greater than 0.02 up to 1.0 weight percent.

25. (original) The method of claim 12, wherein electropolishing at the least one surface of the article comprises:

placing the at least one surface of the article in a bath containing an electropolishing solution and a cathode; and

passing a current between the article and the cathode so that material is removed from the at least one surface, thereby reducing surface roughness of the surface.

26. (original) The method of claim 12, wherein electropolishing the at least one surface improves resistance of the at least one surface to oxidation when subjected to a temperature and an atmosphere characteristic of operating conditions within a solid oxide fuel cell.

27. (original) The method of claim 12, wherein the at least one electropolished surface has oxidation resistance in air at 750°C characterized by a $\log k_p$ less than $-9.1 \text{ g}^2/\text{cm}^4\text{h}$.

28. (original) The method of claim 12, wherein the at least one electropolished surface has oxidation resistance in air at 850°C characterized by a $\log k_p$ less than $-8.5 \text{ g}^2/\text{cm}^4\text{h}$.

29-98. (cancelled)